

Part III—Building Planning and Construction

Chapter 3: Building Planning

General Comments

Chapter 3 is a compilation of the code requirements specific to the building planning sector of the design and construction process. The provisions address a wide variety of issues important to designing a building that is both safe and usable. The limitations placed on the materials and methods of construction contribute to the development of a structurally sound building. Snow, wind and seismic design and flood-resistant construction are regulated, as are the live and dead loads, in Chapter 3.

Fire-resistance-rated assemblies are necessary under two different conditions: (1) where a building is situated very close to a property line, the code addresses the concern for radiant heat exposure in a fire; (2) where two or more dwelling units are housed in a single structure, the code mandates a minimum level of fire separation between all units. Other concerns related to fires include the limitations on wall and ceiling finishes, the requirement for emergency escape and rescue openings, the required installation of smoke alarms throughout the dwelling unit and limitations on the use of foam plastics and other insulation materials. In addition, the specific construction requirements for the common wall between the house and garage and the ceiling assembly between the garage and habitable space are addressed in Chapter 3.

This chapter sets forth traditional code requirements dealing with light, ventilation, sanitation, room size, ceiling height and environmental comfort. Life-safety provisions include limitations on glazing used in hazardous areas, specifications on the use of guards at elevated surfaces, fall protection for open windows, and basic rules for the egress system. This chapter also contains most of the regulations found in the code that deal with the planning and design of dwelling units.

- Section R301 establishes the design criteria, including dead loads, live loads, roof loads, floor loads, snow loads, wind loads and seismic loads.
- Section R302 identifies the requirements for the fire-resistant construction for residential buildings.
- Section R303 establishes the light, ventilation and heating requirements for dwelling units.
- Section R304 establishes the minimum requirements for room areas in dwelling units.
- Section R305 establishes the ceiling height requirements for dwelling units.
- Section R306 contains requirements for sanitation.
- Section R307 contains requirements for toilets and bath and shower spaces.
- Section R308 contains requirements for glazing, hazardous locations of glazing, site-built windows and skylights.
- Section R309 contains provisions for garages and carports.
- Section R310 contains provisions for emergency escape and rescue openings.
- Section R311 establishes the means of egress requirements, including provisions for egress doors, hallways, stairways and ramps.
- Section R312 addresses guards and fall prevention for open windows.
- Section R313 provides requirements for an automatic sprinkler system with the option of complying with NFPA13D or Section P2904.
- Section R314 contains the requirements for smoke alarms.
- Section R315 provides criteria for the installation and location of carbon monoxide (CO) alarms.
- Section R316 addresses the use of foam plastic.
- Section R317 contains requirements for decay protection for wood and wood-based products.
- Section R318 contains requirements for termite protection.
- Section R319 provides the requirements for premise identification (site address).
- Section R320 provides a reference to the *International Building Code*® (IBC®) for accessibility requirements.
- Section R321 addresses elevators and platform lifts.
- Section R322 establishes flood-resistant construction provisions.
- Section R323 references ICC/NSSA 500 for when someone chooses to construct a storm shelter within their home or building.

Purpose

Chapter 3 provides guidelines for a minimum level of structural integrity, life safety, fire safety and livability for inhabitants of dwelling units regulated by the code. The chapter sets forth the requirements that affect the most basic planning and design aspects of dwelling construction. It identifies the various structural loads that are imposed on a building, and it establishes criteria that address each of the imposed loads. In the design of residential structures scoped by the code, there are many climatic and geographical issues that must be considered. This chapter provides guidance in the determination of all appropriate design criteria. In addition, it sets forth the limiting conditions under which a building may be designed and constructed using the code.

Fundamental issues of livability and sanitation are satisfied through the regulation of minimum room sizes and

ceiling heights, as well as basic requirements for toilet rooms and kitchens. Life safety concerns are addressed in a number of areas, including provisions regulating emergency escape and rescue openings, glazing in areas subject to human impact and exiting. The chapter establishes minimum specifications for a number of different building components, including stairways, ramps, landings, handrails, guards and fall protection for open windows. It deals with fire-safety issues, such as automatic sprinkler systems, early fire detection by smoke alarms, exterior wall protection for proximity to property lines, separation of dwelling units in multiple-family buildings, and control of fire spread across wall and ceiling finishes. Other life safety concerns are dealt with by requirements for CO detectors and guidance for the design of storm shelters. Property protection is also a concern, with provisions established for protection against decay and termites.

SECTION R301 DESIGN CRITERIA

R301.1 Application. Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

❖ This section specifies the minimum design loads required for structures built in accordance with the provisions of the code. In structural design, loads are generally divided into two categories: gravity loads, which act vertically; and lateral loads, which act horizontally. Lateral loads typically result from either wind (see Section R301.2.1), earthquakes (see Section R301.2.2) or flood loads (see Section R301.2.4). Although wind, flood and earthquake design may concern themselves with lateral loads, there are also vertical force components that should be considered.

All structures must be designed to support these loads and provide a complete load path capable of transferring these loads from their point of origin through the appropriate load-resisting elements and foundation and, ultimately, to the supporting soil. The charging statement specifically states that any building or structure that has been built in strict compliance with the code provides a complete load path that meets all requirements for load transfer from the point of origin to the foundation. A load path that is either incomplete or inadequate will expose the structure to damage just as surely as an undersized structural member will. The concept of a complete load path is a fundamental principle in structural engineer-

ing, and the code makes it clear that a complete load path must be provided.

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards, the design shall comply with the *International Building Code*.

1. AF&PA *Wood Frame Construction Manual* (WFCM).
2. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (AISI S230).
3. ICC *Standard on the Design and Construction of Log Structures* (ICC 400).

❖ This section permits the use of alternative prescriptive framing methods. Wood framing is permitted to comply with the provisions of the American Forest and Paper Association's (AF&PA)WFCM, *Wood Frame Construction Manual for One- and Two-family Dwellings*. Cold-formed steel framing is permitted to comply with American Iron and Steel Institute's (AISI) S230, *Standard for Cold-formed Steel Framing-prescriptive Method for One- and Two-family Dwellings*. Log homes can be constructed using ICC 400, *Standard on the Design and Construction of Log Structures*. Engineered design in accordance with the IBC is required when a building is beyond (or exceeds) the applicability limits of these standards.

R301.1.2 Construction systems. The requirements of this code are based on platform and balloon-frame construction for light-frame buildings. The requirements for concrete and masonry buildings are based on a balloon framing system. Other framing systems must have equivalent detailing to ensure force transfer, continuity and compatible deformations.

❖ The requirements of the code are based on platform or balloon-frame construction for light-frame buildings (see the definitions of "Platform construction" and

“Light-frame construction” in Chapter 2) and on a balloon-framing system for concrete and masonry buildings.

R301.1.3 Engineered design. When a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301 or otherwise not conforming to this code, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with the *International Building Code* is permitted for all buildings and structures, and parts thereof, included in the scope of this code.

❖ Generally, proper application of the code requires a clear understanding of and adherence to its prescriptive limitations, which are based on conventional construction. However, a building may contain structural elements that are either unconventional or exceed the prescriptive limitations of the code. This is acceptable, if these elements are designed in accordance with accepted engineering practice by a design professional.

R301.2 Climatic and geographic design criteria. Buildings shall be constructed in accordance with the provisions of this

code as limited by the provisions of this section. Additional criteria shall be established by the local *jurisdiction* and set forth in Table R301.2(1).

❖ This section establishes the design criteria that vary based on location and/or climate. Some of the criteria reflect loading, such as earthquake, flood and wind; others reflect susceptibility to damage from hazards, such as weather exposure or termites. Additional criteria may be established by local jurisdictions as necessary. These would include, for example, whether a site is within a wind-borne debris region as described in Section R301.2.1.2, of this commentary. Table R301.2(1) lists the criteria that must be established within each jurisdiction for any project constructed under the code. The table must be filled in by the jurisdiction adopting the code for their particular area. Note that some of these criteria (e.g., wind exposure category or flood hazard) can vary within a given jurisdiction and may need to be established on a site-by-site (or project-by-project) basis. The table serves as a useful reminder for code enforcement personnel, builders, designers and owners. Verifying this information up front aids compliance with the code.

Table R301.2(1). See below.

❖ Table R301.2(1) is designed so that jurisdictions recognize certain climatic and geographic design criteria

**TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA**

GROUND SNOW LOAD	WIND DESIGN		SEISMIC DESIGN CATEGORY ^f	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP ^e	ICE BARRIER UNDERLAYMENT REQUIRED ^h	FLOOD HAZARDS ^g	AIR FREEZING INDEX ⁱ	MEAN ANNUAL TEMP ^j
	Speed ^d (mph)	Topographic effects ^k		Weathering ^a	Frost line depth ^b	Termite ^c					

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

- Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The weathering column shall be filled in with the weathering index (i.e., “negligible,” “moderate” or “severe”) for concrete as determined from the Weathering Probability Map [Figure R301.2(3)]. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.
- The frost line depth may require deeper footings than indicated in Figure R403.1(1). The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.
- The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.
- The jurisdiction shall fill in this part of the table with the wind speed from the basic wind speed map [Figure R301.2(4)A]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.
- The outdoor design dry-bulb temperature shall be selected from the columns of 971/2-percent values for winter from Appendix D of the *International Plumbing Code*. Deviations from the Appendix D temperatures shall be permitted to reflect local climates or local weather experience as determined by the building official.
- The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.
- The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction’s entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of all currently effective FIRMs and FBFMs or other flood hazard map adopted by the authority having jurisdiction, as amended.
- In accordance with Sections R905.2.7.1, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall fill in this part of the table with “NO.”
- The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.2(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F)” at www.ncdc.noaa.gov/fpsf.html.
- The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F)” at www.ncdc.noaa.gov/fpsf.html.
- In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall indicate “NO” in this part of the table.